What is claimed:

1. A resonant element, comprising:

an upper conducting plane disposed in a first plane of symmetry;

a lower conducting plane disposed in a second plane of symmetry;

a resonant via;

an upper conducting pad coupled to one end of the resonant via and disposed in a plane parallel to the first plane of symmetry; and

a lower conducting pad coupled to the other end of the resonant via and disposed in a plane substantially parallel to the second plane of symmetry.

2. The resonant element of claim 1, wherein the upper conducting pad is external relative to the first and second conducting planes.

3. The resonant element of claim 1, wherein the upper conducting pad is internal relative to the first and second conducting planes.

4. The resonant element of claim 1, wherein the lower conducting pad is external relative to the first and second conducting planes.

5. The resonant element of claim 1, wherein the lower conducting pad is internal relative to the first and second conducting planes.

6. The resonant element of claim 1, wherein the first and second conducting pads are internal relative to the first and second conducting planes.

7. The resonant element of claim 1, wherein the first and second conducting pads are external relative to the first and second conducting planes.

8. The resonant element of claim 1, wherein the first and second conducting planes are metallic layers incorporated within a multi-layer printed circuit board and the resonant via comprises a plated through-hole via.

9. The resonant element of claim 1, wherein the combined inductance and capacitance of the resonant element forms an electromagnetically resonant shunt circuit between the first and second conducting planes for a certain frequency range.

10. An electromagnetically reactive structure for attenuating the propagation of electromagnetic radiation, comprising:

an upper conducting plane disposed in a first plane of symmetry;

a lower conducting plane disposed in a second plane of symmetry;

a plurality of resonators, each of the plurality of resonators comprising:

a resonant via,

an upper conducting pad coupled proximate to one end of the resonant via and disposed in a plane parallel to the first plane of symmetry, and

a lower conducting pad coupled proximate to the other end of the resonant via and disposed in a plane substantially parallel to the second plane of symmetry.

11. The electromagnetically reactive structure of claim 10, wherein the plurality of resonators are disposed in a two-dimensional periodic array lying between the first and second conducting planes.

12. The electromagnetically reactive structure of claim 10, wherein the first and second conducting planes comprise a waveguide, and wherein the plurality of resonators are interposed between the first and second conducting planes.

13. The electromagnetically reactive structure of claim 12, wherein the number, geometry, inductance, and capacitance of the discrete conductors effects an electromagnetic stop band within the waveguide.

14. The electromagnetically reactive structure of claim 13, wherein the plurality of resonators are disposed in two dimensions with spacing less than about one-half the wavelength of the desired stop band frequency.

15. The electromagnetically reactive structure of claim 10, wherein the upper conducting pad for at least some of the plurality of resonators is external relative to the first and second conducting planes.

16. The electromagnetically reactive structure of claim 10, wherein the upper conducting pad for at least some of the plurality is internal relative to the first and second conducting planes.

17. The electromagnetically reactive structure of claim 10, wherein the lower conducting pad for at least some of the resonators is external relative to the first and second conducting planes.

18. The electromagnetically reactive structure of claim 10, wherein the lower conducting pad for at least some of the plurality of resonators is internal relative to the first and second conducting planes.

19. The electromagnetically reactive structure of claim 10, wherein the first and second conducting pads for at least some of the resonators are internal relative to the first and second conducting planes.

20. The electromagnetically reactive structure of claim 10, wherein the first and second conducting pads for at least some of the resonators are external relative to the first and second conducting planes.

21. The electromagnetically reactive structure of claim 10, wherein the first and second conducting planes are metallic layers incorporated within a multi-layer printed circuit board and the resonant via comprises a plated through-hole via.

22. The electromagnetically reactive structure of claim 10, wherein the combined inductance and capacitance of the resonant element for each of

the plurality of resonators forms an electromagnetically resonant shunt circuit between the first and second conducting planes for a certain frequency range.

23. A layered assembly, comprising:

an upper conducting plane disposed in a first plane of symmetry;

a lower conducting plane disposed in a second plane of symmetry; and

an electromagnetically reactive structure for attenuating the propagation of electromagnetic radiation, including a plurality of resonators, each of the plurality of resonators comprising:

a resonant via,

an upper conducting pad coupled proximate to one end of the resonant via and disposed in a plane parallel to the first plane of symmetry, and

a lower conducting pad coupled proximate to the other end of the resonant via and disposed in a plane substantially parallel to the second plane of symmetry.

24. The layered assembly of claim 23, wherein the plurality of resonators are disposed in a two-dimensional periodic array lying between the first and second conducting planes.

25. The layered assembly of claim 23, wherein the first and second conducting planes comprise a waveguide, and wherein the plurality of resonators are interposed between the first and second conducting planes.

26. The layered assembly of claim 25, wherein the number, geometry, inductance, and capacitance of the resonators effects an electromagnetic stop band within the waveguide.

27. The layered assembly of claim 25, wherein the plurality of resonators are disposed in two dimensions with spacing less than about one-half the wavelength of the desired stop band frequency.

28. The layered assembly of claim 23, wherein the upper conducting pads for at least some of the plurality of resonators are external relative to the first and second conducting planes.

29. The layered assembly of claim 23, wherein the upper conducting pads for at least some of the plurality are internal relative to the first and second conducting planes.

30. The layered assembly of claim 23, wherein the lower conducting pads for at least some of the resonators are external relative to the first and second conducting planes.

31. The layered assembly of claim 23, wherein the lower conducting pads for at least some of the plurality of resonators are internal relative to the first and second conducting planes.

32. The layered assembly of claim 23, wherein the first and second conducting pads for at least some of the resonators are internal relative to the first and second conducting planes.

33. The layered assembly of claim 23, wherein the first and second conducting pads for at least some of the resonators are external relative to the first and second conducting planes.

34. The layered assembly of claim 23, wherein the first and second conducting planes are metallic layers incorporated within a multi-layer printed wiring board and the resonant via comprises a plated through-hole via.

36. The layered assembly of claim 23, wherein the combined inductance and capacitance of the resonant element for each of the plurality of resonators forms an electromagnetically resonant shunt circuit between the first and second conducting planes for a certain frequency range.

37. The layered assembly of claim 23, wherein the layered assembly is a printed circuit board.

38. The layered assembly of claim 23, wherein the layered assembly is an integrated semiconductor chip.

39. The layered assembly of claim 23, wherein the layered assembly is a multi-chip module.

40. An electromagnetically reactive structure for attenuating the propagation of electromagnetic waves comprising:

a first conducting plane disposed within a first plane of symmetry in a three-dimensional periodic loaded wire media model,

a second electrically isolated conducting plane disposed within a second plane of symmetry in a three-dimensional periodic loaded wire media model, thereby forming a parallel plate waveguide, and

a plurality of resonators, each resonator of the plurality embodying a truncated segment of the three-dimensional periodic loaded wire media model and for which some portion thereof is external to at least one of the conducting planes for at least some resonators of the plurality.

41. The electromagnetically reactive structure of claim 40, wherein the number resonators in the plurality of resonators and the location, capacitance, and inductance of each resonator of the plurality is selected to achieve an electromagnetic stop band within the waveguide.

42. The electromagnetically reactive structure of claim 41, wherein the electromagnetic stop band is selected to block transverse propagation of undesirable signals comprising frequencies within the stop band.

43. The electromagnetically reactive structure of claim 40, wherein the first and second conducting planes are metallic layers incorporated within a multi-layer preformed panel circuit.

44. The electromagnetically reactive structure of claim 40, wherein each resonator of the plurality comprises a plated through-hole via.

45. The electromagnetically reactive structure of claim 44, wherein each resonator of the plurality comprises a first conducting pad coupled with a

plated through-hole via proximate the first end, wherein the first pad for at least some resonators of the plurality is in a first plane that is parallel and external to the first conducting plane.

46. The electromagnetically reactive structure of claim 45, wherein the first conducting pad for at least some resonators of the plurality is in a second plane that is parallel with and internal to the first conducting plate.

47. The electromagnetically reactive structure of claim 46, wherein at least some resonators of the plurality comprise a second conducting pad, and wherein the second conducting pad for at least some resonators of the plurality is in a third conducting plane that is parallel with and internal to the second conducting plane.

48. The electromagnetically reactive structure of claim 47, wherein the second conducting pad for at least some resonators of the plurality is in a fourth conducting plane that is parallel with and external to the second conducting plane.

49. The electromagnetically reactive structure of claim 45, wherein the first pad for at least some resonators of the plurality is in a second plane that is parallel with and external to the second conducting plate.

50. The electromagnetically reactive structure of claim 45, wherein the first pad for at least some of the plurality of resonators is in a second plane that is parallel with and internal to the second conducting plane.

51. An electromagnetically reactive structure of claim 10 wherein some of the resonators form a periodic array having a first period, and the remainder of the resonators form a periodic array having a second period that is an integer multiple of the first period.

52. The layered assembly of claim 23 wherein some of the resonators comprise a periodic array having a first period, and the remainder of the resonators comprise a second periodic array having a second period that is an integer multiple of the first period.

53. The electromagnetically reactive structure of claim 40 wherein some of the resonators comprise a periodic array having a first period, and the remainder of the resonators comprise a second periodic array having a second period that is an integer multiple of the first period.